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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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STEIN, MCEWEN & BUI, LLP 1400 EYE STREET, NW SUITE 300 WASHINGTON, DC 20005				
EXAMINER ALEJANDRO, RAYMOND				
ART UNIT			PAPER NUMBER	
1745				

DATE MAILED: 08/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/092,300

Applicant(s)

KWEON ET AL.

Examiner

Raymond Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 August 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1 and 10 is/are pending in the application.
- 4a) Of the above claim(s) 15-23, 32, 34-35 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 10 and 38-41 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 March 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Response to Amendment***

This document is responsive to applicant's reply dated 08/10/06. Applicant's amendment overcame only the claim rejections under Section 112 and 102. The double patenting rejections and the 35 USC 103 have not yet been overcome. Refer to the foregoing amendment for substance of applicant's rebuttal arguments and remarks. Therefore, the present claims remain rejected over the previous ground of rejection as well as a new combination of reference as set forth hereinbelow and for the reasons of record:

### ***Election/Restrictions and Claim Disposition***

1. This application contains claims 15-23, 32 and 34-35 drawn to an invention nonelected with traverse in Paper No. 12/05/03. A complete reply to this final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.
2. Claims 2, 5, 11 and 13 have been cancelled without prejudice or disclaimer.

### ***Double Patenting***

3. Applicant is advised that should claim 38 be found allowable, claim 39 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

***Double Patenting***

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

5. Claims 1-2, 5, 10-11 and 13 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-3, 11 and 15 of U.S. Patent No. 6797435 in view of Amatucci et al 5705291. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

The '435 patent claims the following (CLAIMS 1-3, 11 and 15):

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1. A positive active material for a rechargeable lithium battery comprising:

a core comprising a lithiated compound; and

15 at least two surface-treatment layers formed on said core, each of said surface-treatment layers comprising at least one compound selected from the group consisting of a coating-element-included hydroxide, a coating-element-included oxyhydroxide, a coating-element-included oxycarbonate, and a coating-element-included hydroxycarbonate,

wherein the coating element is selected from the group consisting of Al, Si, Ti, Sn, V, Ge, Ga, B, and As.

25 2. The positive active material according to claim 1, wherein:

the lithiated compound is selected from the group consisting of compounds represented by the formulas 1 to 13:

30

	$\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{A}_z$	(1)
	$\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{O}_{2-z}\text{X}_z$	(2)
	$\text{Li}_x\text{Mn}_2\text{O}_{4-z}\text{X}_z$	(3)
35	$\text{Li}_x\text{Mn}_{2-y}\text{M}_y\text{A}_z$	(4)
	$\text{Li}_x\text{Co}_{1-y}\text{M}_y\text{A}_z$	(5)
	$\text{Li}_x\text{Co}_{1-y}\text{M}_y\text{O}_{2-z}\text{X}_z$	(6)
	$\text{Li}_x\text{Ni}_{1-y}\text{M}_y\text{A}_z$	(7)
	$\text{Li}_x\text{Ni}_{1-y}\text{M}_y\text{O}_{2-z}\text{X}_z$	(8)
	$\text{Li}_x\text{Ni}_{1-y}\text{Co}_y\text{O}_{2-z}\text{X}_z$	(9)
40	$\text{Li}_x\text{Ni}_{1-y-z}\text{Co}_y\text{M}_z\text{A}_a$	(10)
	$\text{Li}_x\text{Ni}_{1-y-z}\text{Co}_y\text{M}_z\text{O}_{2-\alpha}\text{X}_\alpha$	(11)
	$\text{Li}_x\text{Ni}_{1-y-z}\text{Mn}_y\text{M}_z\text{A}_a$	(12)
	$\text{Li}_x\text{Ni}_{1-y-z}\text{Mn}_y\text{M}_z\text{O}_{2-\alpha}\text{X}_\alpha$	(13),

45  $0.95 \leq x \leq 1.1$ ,  $0 \leq y \leq 0.5$ ,  $0 \leq z \leq 0.5$ ,  $0 \leq \alpha \leq 2$ ,

M is one selected from the group consisting of Al, Ni, Co, Mn, Cr, Fe, Mg, Sr, V, or rare earth elements,

A is selected from the group consisting of O, F, S and P, and

50

X is selected from the group consisting of F, S and P.

3. The positive active material according to claim 1, wherein said at least two surface-treatment layers comprise at least two coating elements selected from the group consisting of Al, Si, Ti, Sn, V, Ge, Ga, B, and As.

55

11. A positive active material for a rechargeable lithium battery comprising:

a core comprising a lithiated compound;

a first surface-treatment layer formed on said core, said first surface-treatment layer comprising at least one compound selected from the group consisting of an Al-included hydroxide, an Al-included oxyhydroxide, an Al-included oxycarbonate, and an Al-included hydroxycarbonate; and

65

a second surface-treatment layer formed on said first surface-treatment layer, said second surface-treatment

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layer comprising at least one compound selected from the group consisting of an Si-included hydroxide, an Si-included oxyhydroxide, an Si-included oxycarbonate, and an Si-included hydroxycarbonate.

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15. A positive active material for a rechargeable lithium  
30 battery, comprising:
- a core comprising a lithium-cobalt based compound;
  - a first surface-treatment layer formed on said core, said  
first surface-treatment layer comprising at least one  
35 compound selected from the group consisting of an  
Si-included hydroxide, an Si-included oxyhydroxide,  
an Si-included oxycarbonate, and an Si-included  
hydroxycarbonate; and
  - 40 a second surface-treatment layer formed on said first  
surface-treatment layer, said second surface-treatment  
layer comprising at least one compound selected from  
the group consisting of an Al-included hydroxide, an  
Al-included oxyhydroxide, an Al-included  
oxycarbonate, and an Al-included hydroxycarbonate.

In this case, the application claims are broader or more generic than the patent claims, thus, the application claims are anticipated by the patent claims. Accordingly, a broad limitation/range is anticipated by a narrow limitation/range which lies within the broad limitation. *In re Goodman*.

The '435 patent claims a positive active material as described above. However, the '435 patent does not expressly claim the specific weight percent of the additive compound.

Amatucci et al disclose a positive electrode comprising a lithiated composition particulate comprising the positive electrode which have been coated with a passivating layer of a composition comprising an additive compound including a hydroxide (CLAIMS 1 and 6/ COL 2, lines 5-25). *It is noted that such coating compositions represent additive compounds, that is, compounds added to, included to or incorporated into the positive active material.* It is disclosed that such additive compound can be added in an amount ranging from 0.4 to 1.0 % by weight (EXAMPLES 1-3). In particular, **EXAMPLE 3** shows the addition of 0.4 % of the borate powder (EXAMPLE 3) (*← emphasis added*).

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In spite of these disclosures, it would have been obvious to one skilled in the art at the time the invention was made to use the specific weight percent of the additive compound of Amatucci et al in the positive active material of the '435 patent as the Amatucci et al disclose that positive active materials having such additive weight percent exhibit improved cycle capacity and electrochemical performance. *Furthermore, Amatucci et al directly teach the use of additive compound within the claimed range; and with sufficient specificity.*

6. Claims 1-2, 5, 10-11 and 13 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-5 and 12-17 of U.S. Patent No. 6753111. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

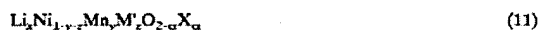
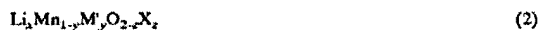
The '111 patent claims the following (CLAIMS 1-5 and 12-17):

1. A positive active material for a rechargeable lithium battery comprising:

- a core comprising a lithiated compound, the lithiated compound comprising a secondary particle having an average size larger than or equal to 1  $\mu\text{m}$  and smaller than 10  $\mu\text{m}$  in diameter, the secondary particle being formed of an agglomeration of small primary particles of an average size of 1 to 3  $\mu\text{m}$  in diameter; and
- a surface-treatment layer on the core, the surface-treatment layer comprising a coating-element-included oxide or a coating-element-included hydroxide, oxyhydroxide, oxycarbonate, hydroxycarbonate or a mixture thereof.

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2. The positive active material according to claim 1,<sup>15</sup> wherein the lithiated compound is at least one compound selected from the group consisting of compounds represented by the formulas 1 to 11:



wherein:

$$0.95 \leq x \leq 1.1, 0 \leq y \leq 0.5, 0 \leq z \leq 0.5, 0, \alpha \leq 2, \quad 40$$

M is Ni or Co,

M' is at least one element selected from the group consisting of Al, Ni, Co, Cr, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, and Pa,<sup>45</sup>

M'' is at least one element selected from the group consisting of Al, Cr, Mn, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, and Pa,<sup>50</sup>

A is selected from the group consisting of O, F, S and P, and

X is selected from the group consisting of F, S and P.

3. The positive active material according to claim 1, wherein the coating element is selected from the group consisting of Mg, Al, Co, K, Na, Ca, Si, Ti, V, Ge, Ga, B, As, and Zr.<sup>55</sup>

4. The positive active material according to claim 1, wherein the content of the coating element of the surface-treatment layer is  $2 \times 10^{-5}$  to 1 wt % based on the weight of positive active material.<sup>60</sup>

5. The positive active material according to claim 4, wherein the content of the coating element of the surface-treatment layer is 0.001 to 1 wt % based on the weight of the positive active material.<sup>65</sup>

In this case, the application claims are broader or more generic than the patent claims, thus, the application claims are anticipated by the patent claims. Accordingly, a broad limitation/range is anticipated by a narrow limitation/range which lies within the broad limitation. *In re Goodman*. It is also noted that the specific weight percent of the additive



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*compound is an obvious variation of the claimed invention in the '111 patent claims as claims 4-5 thereof specifically claims the particular weight percent.*

7. Claims 1-2, 5, 10-11 and 13 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-15, 28-30, 32-35 of copending Application No. 10/189384 (*US Patent Application Publication 2003/0054250*). Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

The copending application '384 claims the following (claims 1-15, 28-30, 32-35):

1. An active material for a battery, comprising:
  - a material that undergoes reversible electrochemical oxidation-reduction reactions and having a surface;
  - a surface treatment layer on the surface and comprising a conductive agent and at least one coating-element-containing compound selected from the group consisting of a coating-element-containing hydroxide, a coating-element-containing oxyhydroxide, a coating-element-containing oxycarbonate, a coating-element-containing hydroxycarbonate, and a mixture thereof.
2. The active material of claim 1, wherein said material is selected from the group consisting of a metal, a lithium-containing alloy, a compound that reversibly forms a lithium-containing compound by a reaction with lithium ions, a material that reversibly intercalates/deintercalates lithium ions and a lithiated intercalation compound.
3. The active material of claim 2, wherein said material comprises the lithiated intercalation compound that is selected from the group consisting of a lithium-containing metal oxide, a lithium-containing chalcogenide compound, and a carbon-based material.
4. The active material of claim 2, wherein said material comprises the lithiated intercalation compound that is at least one selected from the group consisting of a lithium compound with the following formulas (1) to (13):

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$\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{A}_2$	(1)
$\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{O}_{2-x}\text{X}_x$	(2)
$\text{Li}_x\text{Mn}_2\text{O}_{4-x}\text{X}_x$	(3)
$\text{Li}_x\text{Mn}_2\text{O}_4\text{M}_y\text{A}_4$	(4)
$\text{Li}_x\text{Co}_{1-y}\text{M}_y\text{A}_2$	(5)
$\text{Li}_x\text{Co}_{1-y}\text{M}_y\text{O}_{2-x}\text{X}_x$	(6)
$\text{Li}_x\text{Ni}_{1-y}\text{M}_y\text{A}_2$	(7)
$\text{Li}_x\text{Ni}_{1-y}\text{M}_y\text{O}_{2-x}\text{X}_x$	(8)
$\text{Li}_x\text{Ni}_{1-y}\text{Co}_y\text{O}_{2-x}\text{X}_x$	(9)

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-continued

$\text{Li}_x\text{Ni}_{1-y-z}\text{Co}_y\text{M}_z\text{A}_\alpha$	(10)
$\text{Li}_x\text{Ni}_{1-y-z}\text{Co}_y\text{M}_z\text{O}_{2-\alpha}\text{X}_\alpha$	(11)
$\text{Li}_x\text{Ni}_{1-y-z}\text{Mn}_y\text{M}_z\text{A}_\alpha$	(12)
$\text{Li}_x\text{Ni}_{1-y-z}\text{Mn}_y\text{M}_z\text{O}_{2-\alpha}\text{X}_\alpha$	(13)

wherein

$$0.95 \leq x < 1.1; 0 \leq y \leq 0.5; 0 \leq z \leq 0.5; 0 \leq \alpha \leq 2;$$

M is at least one element selected from the group consisting of Al, Ni, Co, Mn, Cr, Fe, Mg, Sr, V, and rare earth elements;

A is at least one element selected from the group consisting of O, F, S, and P; and

X is at least one element selected from the group consisting of F, S, and P.

5. The active material of claim 1, wherein the coating element is soluble in an organic solvent or water.

6. The active material of claim 5, wherein the coating element is at least one selected from the group consisting of an alkali metal, an alkaline earth metal, a group 13 element of the Periodic Table, a group 14 element of the Periodic Table, a group 15 element of the Periodic Table, and a transition metal.

7. The active material of claim 6, wherein the coating element is at least one selected from the group consisting of Mg, Al, Co, K, Na, Ca, Si, Ti, B, As, Zr, Sn, V, Ge, Ga, and a combination thereof.

8. The active material of claim 1, wherein the coating-element-containing compound has either an amorphous or a crystalline phase.

9. The active material of claim 1, wherein a thickness of said surface-treatment layer is 1 to 300 nm.

10. The active material of claim 9, wherein a thickness of said surface-treatment layer is 1 to 100 nm.

11. The active material of claim 1, wherein an amount of the coating element is  $2 \times 10^{-5}$  to 2% by weight of the active material.

12. The active material of claim 11, wherein the amount of the coating element is 0.001 to 2% by weight of the active material.

13. The active material of claim 1, wherein the conductive agent is at least one material selected from the group consisting of a carbon-based conductive agent, a graphite-based conductive agent, a metal-based conductive agent, and a metallic-compound-based conductive agent.

14. The active material of claim 1, wherein an amount of the conductive agent is 0.5 to 10% by weight of the active material.

15. The active material of claim 14, wherein the amount of the conductive agent is 1 to 5% by weight of the active material.

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**28. An active material for a battery comprising:**

a material that has a surface and that undergoes reversible electrochemical oxidation-reduction reactions; and

a surface treatment layer on the surface, the layer comprising a conductive agent and an Al-containing compound selected from the group consisting of an Al-containing hydroxide, an Al-containing oxyhydroxide, an Al-containing oxycarbonate, an Al-containing hydroxycarbonate, and a mixture thereof.

**29. An active material for a battery comprising:**

a material that has a surface and that undergoes reversible electrochemical oxidation-reduction reactions; and

a surface treatment layer on the surface, the layer comprising a conductive agent and a B-containing compound selected from the group consisting of a B-containing hydroxide, a B-containing oxyhydroxide, a B-containing oxycarbonate, a B-containing hydroxycarbonate, and a mixture thereof.

**30. An active material for a battery, comprising:**

a material that has a surface and that undergoes reversible electrochemical oxidation-reduction reactions; and

a surface treatment layer coated on the surface, wherein said coated material is prepared by a method comprising:

adding a conductive agent and a coating-element source to a solvent selected from the group consisting of water, organic solvent, and a mixture thereof to prepare a coating liquid;

adding said material to the coating liquid to coat said material; and

drying the coated material to form the surface-treatment layer comprising the conductive agent and at least one coating-element-containing compound selected from the group consisting of a coating-element-containing hydroxide, a coating-element-containing oxyhydroxide, a coating-element-containing oxycarbonate, a coating-element-containing hydroxycarbonate, and a mixture thereof.

**32. An electrode for use in a battery, comprising:**

a current collector; and

an active material coated with a layer, the layer comprising a conductive agent and at least one compound selected from the group consisting of a coating-element-containing hydroxide, a coating-element-containing oxyhydroxide, a coating-element-containing oxycarbonate, a coating-element-containing hydroxycarbonate, and a mixture thereof,

wherein said active material is coated on said current collector.

**33. A battery comprising:**

a first electrode comprising a current collector and a coated active material, the coated active material comprising a layer including a conductive agent and at least one compound selected from the group consisting of a coating-element-containing hydroxide, a coating-element-containing oxyhydroxide, a coating-element-containing oxycarbonate, a coating-element-containing hydroxycarbonate, and a mixture thereof;

an electrolyte; and

a counter electrode spaced apart from said first electrode to perform reversible oxidation-reduction reactions with said first electrode through said electrolyte.

**34. The active material of claim 1, wherein an average particle size of said material is 1 to 50  $\mu\text{m}$ .****35. The active material of claim 34, wherein the average particle size is 5 to 20  $\mu\text{m}$ .**

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In this case, the application claims are broader or more generic than the copending application'384 claims, thus, the application claims are anticipated by the copending application'384claims. Accordingly, a broad limitation/range is anticipated by a narrow limitation/range which lies within the broad limitation. *In re Goodman*. It is also noted that the specific weight percent of the additive compound is an obvious variation of the claimed invention in the copending application '384 as claims 11-12 and 14-15 thereof specifically claims the particular weight percent.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

8. Claims 1-2, 5, 10-11 and 13 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-5 and 23-28 of copending Application No. 10/072923 (*US Patent Application Publication 2003/0003352*) in view of Amatucci et al 5705291. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

The copending application'923 claims the following (CLAIMS 1-5 and 23-28):

1. A positive electrode for a rechargeable lithium battery, comprising:

a current collector;

a positive active material layer coated on said current collector, said positive active material layer comprising a positive active material; and

a surface-treatment layer on said positive active material layer, said surface treatment layer comprising a compound selected from the group consisting of a coating-element-included hydroxide, a coating-element-included oxyhydroxide, a coating-element-included oxycarbonate, a coating-element-included hydroxycarbonate, and a mixture thereof.

2. The positive electrode according to claim 1, wherein said positive active material comprises a lithiated compound selected from the group consisting of compounds represented by the formulas 1 to 13:

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$\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{A}_2$	(1)
$\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{O}_{2-z}\text{X}_z$	(2)
$\text{Li}_x\text{Mn}_2\text{O}_{4-z}\text{X}_z$	(3)
$\text{Li}_x\text{Mn}_{2-y}\text{M}_y\text{A}_4$	(4)
$\text{Li}_x\text{Co}_{1-y}\text{M}_y\text{A}_2$	(5)
$\text{Li}_x\text{Co}_{1-y}\text{M}_y\text{O}_{2-z}\text{X}_z$	(6)
$\text{Li}_x\text{Ni}_{1-y}\text{M}_y\text{A}_2$	(7)
$\text{Li}_x\text{Ni}_{1-y}\text{M}_y\text{O}_{2-z}\text{X}_z$	(8)
$\text{Li}_x\text{Ni}_{1-y}\text{Co}_y\text{O}_{2-z}\text{X}_z$	(9)
$\text{Li}_x\text{Ni}_{1-y-z}\text{Co}_y\text{M}_z\text{A}_4$	(10)
$\text{Li}_x\text{Ni}_{1-y-z}\text{Co}_y\text{M}_z\text{O}_{2-z}\text{X}_z$	(11)
$\text{Li}_x\text{Ni}_{1-y-z}\text{Mn}_y\text{M}_z\text{A}_4$	(12)
$\text{Li}_x\text{Ni}_{1-y-z}\text{Mn}_y\text{M}_z\text{O}_{2-z}\text{X}_z$	(13)

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wherein:

$$0.95 \leq x \leq 1.1; 0 \leq y \leq 0.5; 0 \leq z \leq 0.5; 0 \leq \alpha \leq 2,$$

M is one element selected from the group consisting of Al, Ni, Co, Mn, Cr, Fe, Mg, Sr, V, and rare earth elements,

A is selected from the group consisting of O, F, S, and P, and

X is selected from the group consisting of F, S, and P.

3. The positive electrode according to claim 1, wherein said surface-treatment layer comprises a coating-element selected from the group consisting of Mg, Al, Co, k, Na, Ca, Si, Ti, Sn, V, Ge, Ga, B, As, and Zr.

4. The positive electrode according to claim 1, wherein said surface-treatment layer is formed by coating the positive active material layer with a coating liquid.

5. The positive electrode according to claim 4, wherein the coating process includes one of a dipping method and a vacuum impregnation method.

23. A positive electrode for a rechargeable lithium battery, comprising:

a current collector;

a positive active material layer coated on said current collector, said positive active material layer comprising a positive active material selected from the group consisting of lithium-cobalt chalcogenide, lithium-manganese chalcogenide, lithium-nickel chalcogenide and lithium-nickel-manganese chalcogenide; and

a surface-treatment layer on said positive active material layer, said surface treatment layer comprising a com-

pound selected from the group consisting of a coating-element-included hydroxide, a coating-element-included oxyhydroxide, a coating-element-included oxycarbonate, a coating-element-included hydroxycarbonate, and a mixture thereof,

wherein the coating-element is one of Al and B.

24. A positive electrode for a rechargeable lithium battery, comprising:

a current collector;

a positive active material layer coated on said current collector, said positive active material layer comprising a  $\text{LiCoO}_2$  positive active material; and

a surface-treatment layer disposed on said positive active material layer, said surface treatment layer comprising a compound selected from the group consisting of a coating-element-included hydroxide, a coating-element-included oxyhydroxide, a coating-element-included oxycarbonate, a coating-element-included hydroxycarbonate, and a mixture thereof,

wherein the coating-element is one of Al and B.

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25. A lithium battery comprising:

a first electrode comprising a layer of a lithiated compound coated with a surface treatment layer, the surface treatment layer comprising one of a coating-element-included hydroxide, a coating-element-included oxyhydroxide, a coating-element-included oxycarbonate, a coating-element-included hydroxycarbonate, and a mixture thereof;

a second electrode comprising a material to reversibly intercalate lithium ions; and

a separator and an electrolyte disposed between said first and second electrodes.

26. The lithium battery of claim 25, wherein the coating element comprises one of Mg, Al, Co, K, Na, Ca, Si, Ti, V, Sn, Ge, B, As, and Zr.

27. The lithium battery of claim 25, wherein the surface treatment layer has a thickness of at or between 1 and 100 nm.

28. The lithium battery of claim 25, wherein said first electrode is prepared in accordance with a method comprising:

treating a current collector, which is coated with a layer of a positive active material, with a coating liquid, the coating liquid comprising one of a coating element and a coating-element-included compound; and

drying the treated current collector to form the surface treatment layer comprising one of the coating-element-included hydroxide, the coating-element-included oxyhydroxide, the coating-element-included oxycarbonate, the coating-element-included hydroxycarbonate, and a mixture thereof.

In this case, the application claims are broader or more generic than the copending application'923 claims, thus, the application claims are anticipated by the copending application'923 claims. Accordingly, a broad limitation/range is anticipated by a narrow limitation/range which lies within the broad limitation. *In re Goodman*.

The copending application'923 claims a positive active material as described above. However, the copending application'923 does not expressly claim the specific weight percent of the additive compound.

Amatucci et al disclose a positive electrode comprising a lithiated composition particulate comprising the positive electrode which have been coated with a passivating layer of a composition comprising an additive compound including a hydroxide (CLAIMS 1 and 6/ COL 2, lines 5-25). *It is noted that such coating compositions represent additive compounds, that is,*

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*compounds added to, included to or incorporated into the positive active material.* It is disclosed that such additive compound can be added in an amount ranging from 0.4 to 1.0 % by weight (EXAMPLES 1-3). In particular, **EXAMPLE 3** shows the addition of 0.4 % of the borate powder (EXAMPLE 3) (*← emphasis added*).

In spite of these disclosures, it would have been obvious to one skilled in the art at the time the invention was made to use the specific weight percent of the additive compound of Amatucci et al in the positive active material of the copending application'923 as the Amatucci et al disclose that positive active materials having such additive weight percent exhibit improved cycle capacity and electrochemical performance. *Furthermore, Amatucci et al directly teach the use of additive compound within the claimed range; and with sufficient specificity.*

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

9. Claims 1-2, 5, 10-11 and 13 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 and 25-37 of copending Application No. 09/897445 (*US Patent Application Publication 2002/0071990*). Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

The copending application'445 claims the following (CLAIMS 1-10 and 25-37):

1. A positive active material for a rechargeable lithium battery comprising

a core comprising at least one lithiated compound; and

a surface-treatment layer on the core comprising at least one coating material selected from the group consisting of coating element included hydroxides, oxyhydroxides, oxycarbonates, hydroxycarbonates and a mixture thereof.

2. The positive active material of claim 1 wherein the lithiated compound is at least one lithiated compound represented by the formulas 1 to

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- $$\begin{aligned} \text{Li}_x\text{Mn}_{1-y}\text{M}'_y\text{A}_z & (1) \\ \text{Li}_x\text{Mn}_{1-y}\text{M}'_y\text{O}_{2-z}\text{A}_z & (2) \\ \text{Li}_x\text{Mn}_2\text{O}_{4-z}\text{A}_z & (3) \\ \text{Li}_x\text{Mn}_{2-y}\text{M}'_y\text{A}_4 & (4) \\ \text{Li}_x\text{M}_{1-y}\text{M}'_y\text{A}_2 & (5) \\ \text{Li}_x\text{MO}_{2-z}\text{A}_z & (6) \\ \text{Li}_x\text{Ni}_{1-y}\text{Co}_y\text{O}_{2-z}\text{A}_z & (7) \\ \text{Li}_x\text{Ni}_{1-y-z}\text{Co}_y\text{M}'_z\text{A}_\alpha & (8) \\ \text{Li}_x\text{Ni}_{1-y-z}\text{Mn}_y\text{M}'_z\text{A}_\alpha & (9) \\ \text{Li}_x\text{Ni}_{1-y-z}\text{Co}_y\text{M}'_z\text{O}_{2-\alpha} & (10) \\ \text{Li}_x\text{Ni}_{1-y-z}\text{Mn}_y\text{M}'_z\text{O}_{2-\alpha}\text{X}_\alpha & (11) \end{aligned}$$

where

$$0.95 \leq x \leq 1.1, 0 \leq y \leq 0.5, 0 \leq z \leq 0.5, 0 \leq \alpha \leq 2,$$

M is Ni or Co,

M' is at least one element selected from the group consisting of Al, Ni, Co, Cr, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No and Lr,

M' is at least one element selected from the group consisting of Al, Cr, Mn, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No and Lr,

A is selected from the group consisting of O, F, S and P, and

X is selected from the group consisting of F, S and P.

3. The positive active material of claim 1 wherein the coating element of the coating material is soluble in organic solvents or water.

4. The positive active material of claim 3 wherein the coating element of the coating material is at least one element selected from the group consisting of Mg, Al, Co, K, Na, Ca, Si, Ti, Sn, V, Ge, Ga, B, As, Zr, and a mixture thereof.

5. The positive active material of claim 1 wherein the coating material has amorphous or crystalline form.

6. The positive active material of claim 1 wherein the surface-treatment layer has a thickness in the range of 0.1 to 300nm.

7. The positive active material of claim 6 wherein the surface-treatment layer has a thickness in the range of 0.1 to 100nm.

8. The positive active material of claim 7 wherein the surface-treatment layer has a thickness in the range of 0.1 to 50nm.

9. The positive active material of claim 1 wherein the content of the coating element of the coating material is  $2 \times 10^{-3}$  to 2 percent by weight based on the weight of the positive active material.

10. The positive active material of claim 9 wherein the content of the coating element of the coating material is 0.001 to 2 percent by weight based on the weight of the positive active material.

25. A positive active material for a rechargeable lithium battery comprising

a core comprising at least one lithiated compound; and

a surface-treatment layer on the core comprising coating element- included-hydroxide or oxyhydroxide.

26. The positive active material of claim 25 wherein the lithiated compound is at least one lithiated compound represented by formulas 1 to 11.



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- $$\begin{aligned} \text{Li}_x\text{Mn}_{1-y}\text{M}'_y\text{A}_2 & (1) \\ \text{Li}_x\text{Mn}_{1-y}\text{M}'_y\text{A}_{2-x}\text{A}_x & (2) \\ \text{Li}_x\text{Mn}_2\text{O}_{4-x}\text{A}_x & (3) \\ \text{Li}_x\text{Mn}_2\text{M}'_y\text{A}_4 & (4) \\ \text{Li}_x\text{M}_{1-y}\text{M}''_y\text{A}_2 & (5) \\ \text{Li}_x\text{MO}_{2-x}\text{A}_x & (6) \\ \text{Li}_x\text{Ni}_{1-y}\text{Co}_y\text{O}_{2-x}\text{A}_x & (7) \\ \text{Li}_x\text{Ni}_{1-y-x}\text{Co}_y\text{M}''_x\text{A}_\alpha & (8) \\ \text{Li}_x\text{Ni}_{1-y-x}\text{Mn}_y\text{M}''_x\text{A}_\alpha & (9) \\ \text{Li}_x\text{Ni}_{1-y-x}\text{Co}_y\text{M}''_z\text{O}_{2-\alpha}\text{X}_\alpha & (10) \\ \text{Li}_x\text{Ni}_{1-y-x}\text{Mn}_y\text{M}''_z\text{O}_{2-\alpha}\text{X}_\alpha & (11) \end{aligned}$$

where

$$0.95 \leq x \leq 1.1, 0 \leq y \leq 0.5, 0 \leq z \leq 0.5, 0 \leq \alpha \leq 2,$$

M is Ni or Co,

M' is at least one element selected from the group consisting of Al, Ni, Co, Cr, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No and Lr, M'' is at least one element selected from the group consisting of Al, Cr, Mn, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No and Lr,

A is selected from the group consisting of O, F, S and P, and

X is selected from the group consisting of F, S and P.

27. The positive active material of claim 25 wherein the coating element of the surface treatment layer is soluble in organic solvents or water.

28. The positive active material of claim 25 wherein the coating element of the surface treatment layer is at least one element selected from the group consisting of Mg, Al, Co, K, Na, Ca, Si, Ti, Sn, V, Ge, Ga, B, As, Zr, and a mixture thereof.

29. The positive active material of claim 25 wherein the coating material has amorphous or crystalline form.

30. The positive active material of claim 25 wherein the content of the coating element of the surface-treatment layer is  $2 \times 10^{-5}$  to 2 percent by weight based on the weight of the positive active material.

31. The positive active material of claim 30 wherein the content of the coating element of the surface-treatment layer is 0.001 to 2 percent by weight based on the weight of the positive active material.

32. A positive active material for a rechargeable lithium battery comprising:

a core comprising a lithium-cobalt chalcogenide compound; and

a surface-treatment layer on the core comprising  $\text{Al}(\text{OH})_3$  or  $\text{AlO}(\text{OH})$ .

33. The positive active material of claim 32 wherein the content of Al of the surface-treatment layer is  $2 \times 10^{-5}$  to 2 percent by weight based on the weight of the positive active material.

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34. The positive active material of claim 33 wherein the content of Al of the surface-treatment layer is 0.001 to 2 percent by weight based on the weight of the positive active material.

35. A positive active material for a rechargeable lithium battery comprising:

a core comprising a lithium-manganese or lithium-cobalt chalcogenide compound; and

a surface-treatment layer on the core comprising  $\text{HB(OH)}_2$ .

36. The positive active material of claim 35 wherein the content of B of the surface-treatment layer is  $2 \times 10^{-5}$  to 2 percent by weight based on the weight of the positive active material.

37. The positive active material of claim 36 wherein the content of B of the surface-treatment layer is 0.001 to 2 percent by weight based on the weight of the positive active material.

In this case, the application claims are broader or more generic than the copending application '445 claims, thus, the application claims are anticipated by the copending application '445 claims. Accordingly, a broad limitation/range is anticipated by a narrow limitation/range which lies within the broad limitation. *In re Goodman. It is also noted that the specific weight percent of the additive compound is an obvious variation of the claimed invention in the copending application '445 as claims 9-10, 30-31 and 36-37 thereof specifically claims the particular weight percent.*

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

10. Claims 1-2, 5, 10-11 and 13 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 and 25-37 of copending Application No. 10/627725 (*US Patent Application Publication 2004/0018429*).

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Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

The copending application'725 claims the following (CLAIMS 1-10 and 25-37):

1. A positive active material for a rechargeable lithium battery comprising

a core comprising at least one lithiated compound; and

a surface-treatment layer on the core comprising at least one coating material selected from the group consisting of coating element included-hydroxides, oxyhydroxides, oxycarbonates, hydroxycarbonates and a mixture thereof.

2. The positive active material of claim 1 wherein the lithiated compound is at least one lithiated compound represented by the formulas 1 to 11,



where

$$0.95 \leq x \leq 1.1, 0 \leq y \leq 0.5, 0 \leq z \leq 0.5, 0 \leq w \leq 2,$$

M is Ni or Co,

M' is at least one element selected from the group consisting of Al, Ni, Co, Cr, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No and Lr,

M'' is at least one element selected from the group consisting of Al, Cr, Mn, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No and Lr,

A is selected from the group consisting of O, F, S and P, and

X is selected from the group consisting of F, S and P.

3. The positive active material of claim 1 wherein the coating element of the coating material is soluble in organic solvents or water.

4. The positive active material of claim 3 wherein the coating element of the coating material is at least one element selected from the group consisting of Mg, Al, Co, K, Na, Ca, Si, Ti, Sn, V, Ge, Ga, B, As, Zr, and a mixture thereof.

5. The positive active material of claim 1 wherein the coating material has amorphous or crystalline form.

6. The positive active material of claim 1 wherein the surface-treatment layer has a thickness in the range of 0.1 to 300 nm.

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7. The positive active material of claim 6 wherein the surface-treatment layer has a thickness in the range of 0.1 to 100 nm.

8. The positive active material of claim 7 wherein the surface-treatment layer has a thickness in the range of 0.1 to 50 nm.

9. The positive active material of claim 1 wherein the content of the coating element of the coating material is  $2 \times 10^{-3}$  to 2 percent by weight based on the weight of the positive active material.

10. The positive active material of claim 9 wherein the content of the coating element of the coating material is 0.001 to 2 percent by weight based on the weight of the positive active material.

25. A positive active material for a rechargeable lithium battery comprising

a core comprising at least one lithiated compound; and

a surface-treatment layer on the core comprising coating element-included-hydroxide or oxyhydroxide.

26. The positive active material of claim 25 wherein the lithiated compound is at least one lithiated compound represented by formulas 1 to 11,



where

$$0.95 \leq x \leq 1.1, 0 \leq y \leq 0.5, 0 \leq z \leq 0.5, 0 \leq \alpha \leq 2,$$

M is Ni or Co,

M' is at least one element selected from the group consisting of Al, Ni, Co, Cr, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No and Lr,

M'' is at least one element selected from the group consisting of Al, Cr, Mn, Fe, Mg, Sr, V, Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No and Lr,

A is selected from the group consisting of O, F, S and P, and

X is selected from the group consisting of F, S and P.

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27. The positive active material of claim 25 wherein the coating element of the surface treatment layer is soluble in organic solvents or water.

28. The positive active material of claim 25 wherein the coating element of the surface treatment layer is at least one element selected from the group consisting of Mg, Al, Co, K, Na, Ca, Si, Ti, Sn, V, Ge, Ga, B, As, Zr, and a mixture thereof.

29. The positive active material of claim 25 wherein the coating material has amorphous or crystalline form.

30. The positive active material of claim 25 wherein the content of the coating element of the surface-treatment layer is  $2 \times 10^{-5}$  to 2 percent by weight based on the weight of the positive active material.

31. The positive active material of claim 30 wherein the content of the coating element of the surface-treatment layer is 0.001 to 2 percent by weight based on the weight of the positive active material.

32. A positive active material for a rechargeable lithium battery comprising:

- a core comprising a lithium-cobalt chalcogenide compound; and

- a surface-treatment layer on the core comprising  $\text{Al}(\text{OH})_3$  or,  $\text{AlO}(\text{OH})$ .

33. The positive active material of claim 32 wherein the content of Al of the surface-treatment layer is  $2 \times 10^{-5}$  to 2 percent by weight based on the weight of the positive active material.

34. The positive active material of claim 33 wherein the content of Al of the surface-treatment layer is 0.001 to 2 percent by weight based on the weight of the positive active material.

35. A positive active material for a rechargeable lithium battery comprising:

- a core comprising a lithium-manganese or lithium-cobalt chalcogenide compound; and

- a surface-treatment layer on the core comprising  $\text{HB}(\text{OH})_2$ .

36. The positive active material of claim 35 wherein the content of B of the surface-treatment layer is  $2 \times 10^{-5}$  to 2 percent by weight based on the weight of the positive active material.

37. The positive active material of claim 36 wherein the content of B of the surface-treatment layer is 0.001 to 2 percent by weight based on the weight of the positive active material.

In this case, the application claims are broader or more generic than the copending application'725 claims, thus, the application claims are anticipated by the copending application'725 claims. Accordingly, a broad limitation/range is anticipated by a narrow limitation/range which lies within the broad limitation. *In re Goodman*. It is also noted that the specific weight percent of the additive compound is an obvious variation of the claimed invention

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*in the copending application '725 as claims 9-10, 30-31 and 36-37 thereof specifically claims the particular weight percent.*

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13. Claims 1, 10 and 38-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amatucci et al 5705291 in view of the Japanese publication JP 09-171813 (hereinafter referred to as "*the JP'813 publication*").

The present claims are drawn to a positive active material composition wherein the disclosed inventive concept comprises the specific additive compound.

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In reference to claims 1, 10 and 40-41:

Amatucci et al disclose a positive electrode comprising a lithiated composition particulate comprising the positive electrode which have been coated with a passivating layer of a composition comprising a borate, lithiated borate, aluminate, lithiated aluminate, silicate, lithiated silicate or mixture thereof (ABSTRACT). It is also disclosed that the lithiated intercalation compound is coated with coating compositions comprising boron oxide, boric acid, **lithium hydroxide**, aluminum oxide, lithium aluminate, lithium metaborate, silicon dioxide, lithium silicate or mixtures thereof (CLAIMS 1 and 6/ COL 2, lines 5-25). *It is noted that such coating compositions represent additive compounds, that is, compounds added to, included to or incorporated into the positive active material.*

It is disclosed that such additive compound can be added in an amount ranging from 0.4 to 1.0 % by weight (EXAMPLES 1-3). In particular, **EXAMPLE 3** shows the addition of 0.4 % of the borate powder (EXAMPLE 3) (*← emphasis added*).

6. A rechargeable battery cell comprising a negative  
25 electrode, a positive electrode, and an intermediate nonaqueous electrolyte characterized in that said positive electrode comprises a particulate lithium intercalation compound the particles of which are coated with a passivating layer comprising an annealed coating composition comprising  
30 boron oxide, boric acid, lithium hydroxide, aluminum oxide, lithium aluminate, lithium metaborate, silicon dioxide, lithium silicate, or mixtures thereof.

5 These objects, among others, have been achieved in the present invention by means of a novel lithium intercalation cell in which the surfaces of aggregate lithiated intercalation composition particulates comprising the positive cell electrode have been passivated by coating or encapsulation in a  
10 layer of a composition comprising a borate, lithiated borate, aluminate, lithiated aluminate, silicate, or lithiated silicate. Such a coating not only reduces the surface area, and thus the degree of activity, of the potentially catalytic particulate aggregates, but also provides a barrier layer which, while  
15 limiting contact between the electrolyte and the positive electrode particulates, does not seriously deter the passage of Li<sup>+</sup> ions.

In a preferred embodiment of the present invention, the  
20 surfaces of these particulates are coated with a layer of a composition comprising boron oxide, boric acid, lithium hydroxide, aluminum oxide, lithium aluminate, lithium metaborate, silicon dioxide, lithium silicate, or mixtures thereof. In another embodiment of the present invention, the

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It is disclosed that the coating composition has either a glassy or crystalline form (COL 4, lines 13-17); in particular, the borate is amorphous (EXAMPLE 1).

**With respect to the lithiated compound:** Amatucci et al teach the use of LiCoO<sub>2</sub>, LiNiO<sub>2</sub> and Li<sub>1+x</sub>Mn<sub>2</sub>O<sub>4</sub> (COL 1, line 38-42). **EXAMPLES 1-3** illustrates the specific use of LiMn<sub>2</sub>O<sub>4</sub> (EXAMPLES 1-3).

**With respect to the specific method limitation:** *“the additive compound being prepared by the specific drying and temperature treatment (heat treatment),* it is noted that a method limitation incorporated into a product (namely, product-by-process) claim does not patentable distinguish the product because what is given patentably consideration is the product itself and not the manner in which the product was made. Therefore, the patentability of a product is independent of how it was made.

Moreover, Amatucci et al disclose the process of annealing the material at a temperature in the excess of about 400 °C, preferably in the range of about 500-800 °C (COL 2, lines 19-29). Hence, it is contended that at these temperatures, the drying of liquid necessarily occurs unless the liquid has an evaporation point higher than 800 °C. Nevertheless, the claim language is silent as to the specific chemical composition of the liquid subjected to the drying step.

In reference to claim and 10:

Amatucci et al shows with *sufficient specificity* the use of H<sub>3</sub>BO<sub>3</sub> and/or B<sub>2</sub>O<sub>3</sub> compounds among others. Amatucci et al also disclose the use of composition comprising a borate, lithiated borate, aluminate, lithiated aluminate, silicate, lithiated silicate or mixture thereof (ABSTRACT). It is also disclosed that the lithiated intercalation compound is coated with coating compositions comprising boron oxide, boric acid, lithium hydroxide, aluminum oxide,



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lithium aluminate, lithium metaborate, silicon dioxide, lithium silicate or mixtures thereof (CLAIMS 1 and 6/ COL 2, lines 5-25).

In this respect, it is noted that EXAMPLE 3 shows the use of  $B_2O_3$  and  $LiOH \cdot H_2O$  to obtain a fine lithiated powder (EXAMPLE 3 or COL 5, lines 25-45). *Thus, it is contended that a secondary product of such mixture combination of  $B_2O_3$  and  $LiOH \cdot H_2O$  can be a hydroxide of boron.*

As to claims 38-39:

It is disclosed that positive electrode composition is associated with a current collector member all together (COL 2, lines 60-67).

Amatucci et al'291 disclose a coated positive electrode according to the foregoing aspects. However, the preceding prior art fails to expressly disclose the specific thermal absorbent material; the additive compound not including lithium and not coating with the additive compound.

With respect to claims 1 and 10:

The JP'813 publication discloses a positive electrode active material including an inorganic material (ABSTRACT). In particular, the JP'813 publication discloses an active material comprising a lithiated compound and aluminum hydroxide (SECTION 0019-0021). *It is noted that aluminum hydroxide is a thermal absorbent element.*

The JP'813 publication teaches the use of lithium multiple oxides such as  $LiCoO_2$ ,  $LiNiO_2$ ,  $Li_{1-x}Ni_xCo_{1-y}O_2$  and  $LiMn_2O_4$  (SECTION 0024).

Concerning claims 38-39:

The JP'813 publication teaches the mixing of the lithiated compound and the aluminum hydroxide upon formation thereof and having deposited the composite material on the electrode support (SECTION 0020) including forming a composite slurry which is applied to a foil (SECTIONS 0035-0038).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use the specific additive compound not including lithium and not coating with the additive compound of the JP'813 publication in the positive active material of Amatucci et al as the JP'813 publication teaches that such additive compound provides a positive active material network structure with improved load and capacity characteristics; and excellent charging/discharging cycle-ability.

14. Claims 1, 10 and 38-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amatucci et al 5705291 in view of Yano et al 5827494.

The present claims are drawn to a positive active material composition wherein the disclosed inventive concept comprises the specific additive compound.

In reference to claims 1, 10 and 40:

Amatucci et al disclose a positive electrode comprising a lithiated composition particulate comprising the positive electrode which have been coated with a passivating layer of a composition comprising a borate, lithiated borate, aluminate, lithiated aluminate, silicate, lithiated silicate or mixture thereof (ABSTRACT). It is also disclosed that the lithiated intercalation compound is coated with coating compositions comprising boron oxide, boric acid, **lithium hydroxide**, aluminum oxide, lithium aluminate, lithium metaborate, silicon dioxide,

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lithium silicate or mixtures thereof (CLAIMS 1 and 6/ COL 2, lines 5-25). *It is noted that such coating compositions represent additive compounds, that is, compounds added to, included to or incorporated into the positive active material.*

It is disclosed that such additive compound can be added in an amount ranging from 0.4 to 1.0 % by weight (EXAMPLES 1-3). In particular, **EXAMPLE 3** shows the addition of 0.4 % of the borate powder (EXAMPLE 3) (*← emphasis added*).

6. A rechargeable battery cell comprising a negative  
25 electrode, a positive electrode, and an intermediate nonaqueous electrolyte characterized in that said positive electrode comprises a particulate lithium intercalation compound the particles of which are coated with a passivating layer comprising an annealed coating composition comprising  
30 boron oxide, boric acid, lithium hydroxide, aluminum oxide, lithium aluminate, lithium metaborate, silicon dioxide, lithium silicate, or mixtures thereof.

5 These objects, among others, have been achieved in the present invention by means of a novel lithium intercalation cell in which the surfaces of aggregate lithiated intercalation composition particulates comprising the positive cell electrode have been passivated by coating or encapsulation in a  
10 layer of a composition comprising a borate, lithiated borate, aluminate, lithiated aluminate, silicate, or lithiated silicate. Such a coating not only reduces the surface area, and thus the degree of activity, of the potentially catalytic particulate aggregates, but also provides a barrier layer which, while  
15 limiting contact between the electrolyte and the positive electrode particulates, does not seriously deter the passage of  $\text{Li}^+$  ions.

In a preferred embodiment of the present invention, the surfaces of these particulates are coated with a layer of a  
20 composition comprising boron oxide, boric acid, lithium hydroxide, aluminum oxide, lithium aluminate, lithium metaborate, silicon dioxide, lithium silicate, or mixtures thereof. In another embodiment of the present invention, the

It is disclosed that the coating composition has either a glassy or crystalline form (COL 4, lines 13-17); in particular, the borate is amorphous (EXAMPLE 1).

**With respect to the lithiated compound:** Amatucci et al teach the use of  $\text{LiCoO}_2$ ,  $\text{LiNiO}_2$  and  $\text{Li}_{1+x}\text{Mn}_2\text{O}_4$  (COL 1, line 38-42). **EXAMPLES 1-3** illustrates the specific use of  $\text{LiMn}_2\text{O}_4$  (EXAMPLES 1-3).

**With respect to the specific method limitation:** "*the additive compound being prepared by the specific drying and temperature treatment (heat treatment)*", it is noted that a method

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limitation incorporated into a product (namely, product-by-process) claim does not patentable distinguish the product because what is given patentably consideration is the product itself and not the manner in which the product was made. Therefore, the patentability of a product is independent of how it was made.

*Moreover, Amatucci et al disclose the process of annealing the material at a temperature in the excess of about 400 °C, preferably in the range of about 500-800 °C (COL 2, lines 19-29). Hence, it is contended that at these temperatures, the drying of liquid necessarily occurs unless the liquid has an evaporation point higher than 800 °C. Nevertheless, the claim language is silent as to the specific chemical composition of the liquid subjected to the drying step.*

In reference to claim and 10:

Amatucci et al shows with *sufficient specificity* the use of  $H_3BO_3$  and/or  $B_2O_3$  compounds among others. Amatucci et al also disclose the use of composition comprising a borate, lithiated borate, aluminate, lithiated aluminate, silicate, lithiated silicate or mixture thereof (ABSTRACT). It is also disclosed that the lithiated intercalation compound is coated with coating compositions comprising boron oxide, boric acid, lithium hydroxide, aluminum oxide, lithium aluminate, lithium metaborate, silicon dioxide, lithium silicate or mixtures thereof (CLAIMS 1 and 6/ COL 2, lines 5-25).

In this respect, it is noted that EXAMPLE 3 shows the use of  $B_2O_3$  and  $LiOH-H_2O$  to obtain a fine lithiated powder (EXAMPLE 3 or COL 5, lines 25-45). Thus, it is contended that a secondary product of such mixture combination of  $B_2O_3$  and  $LiOH-H_2O$  can be a hydroxide of boron.

As to claims 38-39:

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It is disclosed that positive electrode composition is associated with a current collector member all together (COL 2, lines 60-67).

Amatucci et al'291 disclose a coated positive electrode according to the foregoing aspects. However, the preceding prior art fails to expressly disclose the specific thermal absorbent material (specific hydroxide compounds).

With respect to claims 1 and 10:

Yano et al disclose electrode active material of batteries using an active material powder which comprises composite particles comprising Ni-hydroxide or solid solutions particles consisting essentially of Ni-hydroxide the surface of which is covered with a mixed of Co-hydroxide and the hydroxide of at least one metal (M) selected from the group consisting of Al, Mg (ABSTRACT). Yano et al further disclose that as regards indium and aluminum, where the content of indium hydroxide or aluminum hydroxide is large, no mixed crystals were obtained due to separation thereof (COL 9, lines 29-33). *Thus, since no crystals were obtained, such hydroxides are not in crystalline form, thereby, they are in amorphous form. Therefore, Yano et al readily envision the addition of a hydroxide of Al, Mg or Co in electrode active materials regardless of the specific battery environment.*

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use the specific thermal absorbent material (specific hydroxide compounds) of Yano et al in the positive active material composition of Amatucci et al as Yano et al reveals that batteries using this electrode as positive electrode can therefore maintain, for a long period of time of charge-discharge cycles, the function of the increasing the conductivity of the electrode, thereby suppressing decrease in the discharge capacity in the course of charge-

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discharge cycles. *As a result, the addition of a hydroxide of either Co, Mg or Al to an electrode active composition provides the benefits discussed above regardless of the specific battery environment. Note that the battery environment cannot be granted patentable weight because such a recitation occurs in the preamble, and substantially calls for an intended use of the positive active material composition.*

### ***Response to Arguments***

15. Applicant's arguments filed 08/10/06 have been thoroughly considered but they are not persuasive.

16. Applicant's arguments with respect to claims 1, 10 and 38-40 have been considered but are moot in view of the new ground(s) of rejection. See item 14.

17. In response to applicant's arguments, the recitation “*for a rechargeable lithium battery*” has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

18. In response to applicant's argument that “*for a rechargeable lithium battery*”, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from

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the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

19. One more time, the arguments raised by the applicant constitute a substantial repetition of the same previously presented arguments. Thus, the examiner's response will be repeated here for the convenience of the applicant.

20. The main contention of applicant's argument is premised on the assertion that "*the JP'813 discloses using aluminum hydroxide as an additive compound in an amount of 10 weight percent in the production of the positive electrode...and not in an amount at or between 0.1 weight % and 1 weight % based on the weight of the positive active material composition*". In this respect, it is particularly noted that while applicant's statement about the teachings of the JP'813 is correct, applicant has completely overlooked the essence of the rejection. In other words, applicant has conveniently ignored the statutory basis used herein to reject claims 1-2, 5, 10-11, 13 and 38-39. Applicant is respectfully reminded that the foregoing claims have been rejected under 35 USC 103(a) as being unpatentable over Amatucci et al'291 in view of the JP'813 publication. That being said, applicant is again reminded that 35 USC 103 statute permits, allows or approves the use of multiple (more than one) references to fully address the claimed limitations of an invention. This is exactly what the examiner has done, so far, in order to constructively address all the limitations. Applicant has argued that "*Because there is no teaching or suggestion in JP'813 of using an additive compound in the amount recited in independent claims 1 and 10, it would not have been obvious to one of ordinary skill in the art to combine Amatucci with JP'813*". However, applicant has been clearly and repeatedly instructed by the examiner that the primary reference (i.e. Amatucci) discloses all the claimed limitations

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except the specific additive compound, that is to say, only the additive compound is not taught in Amatucci, not its respective weight amount. As just mentioned above, Amatucci discloses the use of additive compounds which can be added in an amount ranging from 0.4 to 1.0 % by weight (EXAMPLES 1-3). In particular, **EXAMPLE 3** shows the addition of 0.4 % of an additive powder (EXAMPLE 3) (**← emphasis added**). Stated somewhat differently, the primary reference does fully, completely and fairly address the limitation concerning the specific additive amount but it does not disclose the specific additive compound. And, to remedy such a deficiency the secondary reference (the JP'813) has been introduced or cited because the JP'813 does suggest an active material comprising a lithiated compound and aluminum hydroxide together or collectively. As such, a 35 USC 103 rejection combining these two references was issued. Nothing more, nothing less. Accordingly, the examiner verily believes that his 103 rejection is an appropriate and genuine action as a strong prima-facie case of obviousness has been fairly presented to the applicant.

21. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). *In this case, the two references are found to be pertinent to each other as well as to the field of applicant's endeavor because the two references encompass positive electrode material including a lithiated compound and an additional component (additive). Thus, the chemical*



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*environment or chemistry of two references' active material is so similar and compatible that one of ordinary skill in the art would necessarily end up looking at both references, singly or collectively, in order to address the limitations of the claimed positive active material. Thus, the very similar and compatible chemical environment or chemistry and field of endeavor of Amatucci et al and the JP '813 would suggest the desirability of their combination.*

22. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

*The following responses to applicant's arguments have been presented in previous office actions and are herein repeated to further address applicant's arguments and maintained for the reasons of record:*

23. The main contention of applicant's arguments is premised on the assertion that the primary reference "*fails to teach or suggest an amorphous additive compound*" (See amendment of 08/12/05 at page 9, 5<sup>th</sup> full paragraph) because "*Amatucci discloses using a film for coating...wherein the suitable materials for such coating film are either in a crystalline or glassy form, such as borates or aluminates (column 4, lines 9-15)*" (See amendment of 08/12/05 at page 9, 3<sup>rd</sup> full paragraph). First of all, the examiner likes to point out that applicants have admitted

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that the prior art of record does use glassy form materials for coating. In this regard, applicants are then respectfully requested to double check and review their assertion, and thus, re-evaluate and reconsider their position because those of ordinary skill in the art know that a glassy material (glass) stands for any of various amorphous materials formed from a melt by cooling to rigidity without crystallization (Refer to *Merriam-Webster's, Collegiate Dictionary, 10<sup>th</sup> Edition*). Thus, a glassy material does not crystallize, thereby, it does not possess a crystalline structure. Simply put, glassy materials are amorphous materials. Hence, applicant's arguments with respect to the lack of an amorphous additive compound are in error and completely inapposite.

24. Since applicants have overcome the 35 USC 102 rejection, the examiner will only address applicants' arguments concerning the 35 USC 103 rejection. In this regard, the principal contention of applicant's arguments is premised on the assertion that the prior art of record fails to reveal the specific amount (weight percent) of additive compound in the positive electrode. However, this assertion is not sufficient to overcome the rejection because the prior art (i.e. Amatucci et al'291 and the JP'813 publication) in combination does disclose the use of additive compound within the claimed range. Indeed, applicants' attention is particularly directed to EXAMPLES 1-3 in the Amatucci et al reference. Those examples clearly show using the specific claimed amount of additive compound in the positive electrode. Applicant is reminded that the test for obviousness is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Therefore, in view of the foregoing teachings, the examiner believes that it is fairly reasonable to contend that those of ordinary skill in the art would have sufficient sophistication

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to recognize that the specific additive compound of the JP'813 publication may be added by using exactly the same amount/percent as disclosed in Amatuucci et al'291. Simply put, given that Amatuucci et al'291 evidently teaches the use of an additive compound within the claimed range, the skilled artisan will only need to substitute the JP'813 publication additive in the positive electrode of Amatuucci et al'291. Stated somewhat differently, not because Amatuucci et al'291 fail to disclose the specific additive compound (the material) per se, it means that the additive compound of the JP'813 publication cannot be added in the same manner and amount as Amatuucci et al'291 instruct to add their additive compounds, that is to say, nothing in the Amatuucci et al'291 reference precludes the use of other additive compounds, in particular, the additive compounds of the JP'813 publication. *Thus, in the event that applicants eventually argue that the examiner's position is improper, applicant is now advised that showing of objective evidence would be necessary to demonstrate that the use of the additive compound of the JP'813 publication, when used as taught (i.e. in the same amount/proportion) in Amatuucci et al'291, would cause detrimental or deleterious damage(s) to the positive active material of Amatuucci et al'291. Therefore, the burden would be shifted to the applicants to provide such objective evidence.*

25. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). This is to address applicant's arguments regarding the discussion of the references by itself, alone or singly.

***Conclusion***

26. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

27. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

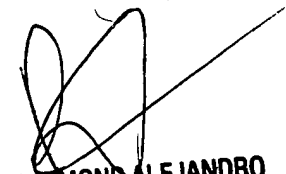
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Raymond Alejandro  
Primary Examiner  
Art Unit 1745



RAYMOND ALEJANDRO  
PRIMARY EXAMINER